

an academic procession from the Christie library to the lecture theatre of the new laboratories, where the chair was taken by the Treasurer of Owens College, Mr. Alderman Thompson. Amongst those present were Lord Rayleigh, Prof. Schuster, Sir Henry Roscoe, Principal Hopkinson, Prof. Oliver J. Lodge, Prof. Bodington (Vice-Chancellor of Victoria University), Prof. Rücker, Prof. Pickering of Harvard College, Prof. Osborne Reynolds, Prof. Stroud, Prof. J. J. Thomson, Prof. Poynting, Prof. Ramsay, Prof. Core, Archdeacon Wilson, Mr. Wimshurst, Prof. Perry, Mr. W. Mather, M.P., and many others. Lord Rayleigh delivered a short address upon physical laboratory work and research, and formally pronounced the building open. Prof. Schuster gave an account of the aims of the building, and of the various stages in their realisation. Prof. Pickering likened a physical laboratory to a battleship, and enlarged upon the uses of its equipment. The company then adjourned, some to visit the various rooms, others to attend the opening ceremony in the John Hopkinson memorial wing, which was presented in a touching speech by Mr. Alderman Hopkinson on behalf of the family.

A garden-party held in the afternoon in the house of Prof. Schuster was followed in the evening by a reception and conversation in the new building. In one of the rooms was a very interesting exhibit of some of the apparatus used by Joule, including two "current weighers," a tangent galvanometer, and a mercury pump. These have been presented to the Owens College by Mr. B. A. Joule. In another room Mr. T. Thorp showed his celluloid gratings and celluloid reproductions of Rowland's grating and of his own echelon grating. Mr. Wilde exhibited his magnetarium and a number of lunar photographs. The large electro-magnet presented by him was also shown in operation.

On the morning of the 30th was the annual ceremony of conferring of degrees of the Victoria University. This took place in the Manchester Free Trade Hall, which was crowded with undergraduates and visitors. The Chancellor, Earl Spencer, presided with great dignity. Honorary degrees were conferred on Lord Rayleigh, Sir William Huggins, Sir William Abney, Sir William Roberts-Austen, Dr. T. E. Thorpe, Prof. Dewar, Prof. Forsyth, Mr. R. T. Glazebrook, Mr. Sidney Lee, Prof. E. Pickering, Prof. J. J. Thomson, and last on the father of the profession of electrical engineering, Mr. Henry Wilde. The ordinary degrees were then conferred upon the successful candidates of the year from the three constituent colleges—Owens College, Liverpool University College, and the Yorkshire College. A luncheon in the Town Hall, given by the Lord Mayor, was subsequently partaken of by the Chancellor, the new Honorary Doctors, the University Professors, and a large number of distinguished visitors.

It has been mentioned that the new physics laboratory exceeds in size any other similar building in England. It is, however, smaller than the physics laboratories of Baltimore, Darmstadt and Strassburg. Its cost has been defrayed by the generosity of private individuals.

NOTES.

Two deputations have recently waited upon Mr. Hanbury to put before him the two sides of the question referring to the proposed establishment of the National Physical Laboratory in the Old Deer Park at Richmond. On one side are some naturalists and inhabitants of the neighbourhood, who protest against the proposed buildings as an interference with the amenities of the neighbourhood of Kew Gardens; on the other are the physicists and the members of the Committee, which, after giving great attention to the question of site, decided that

Kew was most suitable. It is a little unfortunate that this difficulty should have arisen, and it could probably have been avoided by the exercise of a little tact and consideration when selecting the site for the laboratory. Much of the misapprehension which at present exists as to the character of a physical laboratory might thus have been removed. Some people seem to think that the fifteen acres required will be covered with buildings in which noisy operations comparable with those of large engineering workshops will be carried on. This, of course, is entirely incorrect. In the first place, the actual area to be covered by buildings is only a quarter of an acre, or the sixtieth part of the whole area proposed to be taken, and secondly, quiet and freedom from all the perturbing characteristics of towns and manufactories are essential for the investigations to be carried on in the laboratories. When this is kept in mind, the alarm of a certain portion of the public, especially those who appreciate the beauties of Kew Gardens, that the buildings would break the present charm, seems a trifle unnecessary. The Observatory being already in the Old Deer Park, it is natural and proper that the laboratory, which is under the same administration, should be there too. As, however, the Park is over 350 acres in extent, it ought not to be difficult to find another suitable site if there is a persistent opposition to the one already selected. In any case, we are convinced that a *modus vivendi* could be arrived at if the representatives of the opposing interests were to meet one another in a conciliatory spirit.

M. ZAMBACO has been elected a correspondant of the Paris Academy of Sciences, in the section of medicine and surgery.

DR. CORFIELD, professor of hygiene and public health at University College, has been elected a Foreign Corresponding Member of the Royal Academy of Medicine of Belgium.

MR. J. H. MAIDEN, director of the Botanic Gardens, Sydney, is expected to arrive in London at the end of the present month, and will be in the United Kingdom and on the Continent for about three months, engaged in special investigations in botany and agriculture.

THE Duke of Northumberland has been elected a trustee of the British Museum.

THE annual meeting of the Victoria Institute will be held on Monday next, July 16, when an address will be delivered by Prof. Hull, F.R.S.

IT is announced in the *Athenaeum* that Baron von Richthofen has been nominated Director of the newly founded Museum für Meereskunde of the University of Berlin.

A BOTANIC GARDEN has been established by the Belgian Government at Coquilhautville, Congo Free State. It will be called the Kew Gardens, and is expected to be of great importance to the rubber and other tropical industries.

THE Council of the Royal Geographical Society have decided to award the Murchison Grant for next year to Mr. John Coles, late Map Curator and Instructor to the Society, as an acknowledgment of his services to geography.

THE annual meeting of the Society of Chemical Industry will be held in the lecture theatre of the Royal Institution, Albemarle Street, on Wednesday, July 18, when the presidential address will be delivered, and the officers for the ensuing year appointed. The president-elect is Mr. J. W. Swan, F.R.S.

THE Council of the Sanitary Institute have arranged to hold a meeting in Paris from August 7 to 9, which will immediately precede the meeting of the International Congress of Hygiene and Demography, also to be held in Paris. The Société Française d'Hygiène have offered to the members of the Institute

a cordial reception, and are providing a reception room, and making arrangements for special visits and excursions for the benefit of members attending.

A PUBLIC HEALTH CONGRESS will be held at Aberdeen from August 2 to 7, under the auspices of the Royal Institute of Public Health. Among the papers promised may be mentioned the following:—"Disinfection," by Prof. Delépine; "Sewage," by Prof. Percy Frankland, F.R.S.; and "The Origin and Treatment of Malarial Fever," by Dr. Patrick Manson. There will also be submitted and discussed a report on the inquiry made into the chemical and bacteriological condition of the air in the London Board Schools.

THE Home Secretary has appointed a committee to inquire into the working of the method of identification of criminals by measurements and finger prints, and the administrative arrangements for carrying on the same, and to report whether any and what changes are desirable. The members of the committee are Lord Belper (Chairman), Mr. F. A. Bosanquet, Q.C., Common Serjeant, Mr. A. De Rutzen, Metropolitan Police Magistrate, and Mr. C. S. Murdoch, C.B., and Mr. C. E. Troup, C.B., of the Home Office, with Mr. C. Lubbock, of the Home Office, as secretary.

AMONG the Civil List pensions granted during the year ended on June 20, we notice the following:—Mr. Benjamin Harrison, in consideration of his researches in the subject of pre-historic flint implements, 26*l.*; Mr. Thomas Whittaker, in consideration of his philosophical writings, 50*l.*; Mr. Charles James Wollaston, in recognition of his services in connection with the introduction of submarine telegraphy, 100*l.*; Mr. Robert Tucker, in consideration of his services in promoting the study of mathematics, 40*l.*; Mrs. Eliza Arlidge, in consideration of the labours of her late husband, Dr. John Thomas Arlidge, in the cause of industrial hygiene, 50*l.*; Miss Emily Victoria Biscoe, in consideration of the services rendered to Antarctic exploration by her late father, Captain John Biscoe, 30*l.*

SOME molluscan remains found in a sandstone from the Malay Peninsula were described by Mr. R. Bullen Newton at the May meeting of the Malacological Society of London. The shells consist of Lamellibranch casts and impressions, many of them being sufficiently well defined to point conclusively to their Triassic origin. The most abundant genus represented is *myophoria*, so characteristic of the Trias period. *Chlamys valoniensis* also occurs, together with other bivalves. These fossils, the first recorded from this area of south-eastern Asia, were collected by Mr. H. F. Bellamy, and subsequently presented by him to the Geological Department of the British Museum. They were obtained from the Pahang Trunk Road, on the Lipis River.

THE annual meeting of the Museums Association was opened at Canterbury on Monday. In an address, Dr. Henry Woodward, F.R.S., the president-elect, referred to his forty-two years' association with the British Museum and to the many changes and improvements which had taken place there during that period. He advocated the publication by the association of a handbook giving an account of every provincial museum throughout the country, with full particulars as to each, not only as to its officers, organisation, and its plan of arrangement, but also what were the chief features of its exhibits and especially any records concerning types and figured specimens preserved in its collections and any other particulars of general public interest. Papers upon museums and related subjects were subsequently read.

A NEW medical institute, having for its object the placing at the disposal of doctors the aids to diagnosis required in many forms of disease, has just been opened in Berlin. The institute

will place at the disposal of the medical profession its laboratories, instruments and apparatus, and its officers will undertake the carrying out of special researches and examinations. It has departments devoted to the study of bacteriology, chemical microscopy, pathological anatomy, and physiology. To the last-named is attached a Röntgen ray room.

GENERAL SIR R. MURDOCH SMITH, K.C.M.G., Director-General of the Museum of Science and Art, Edinburgh, since 1885, died on July 3, after a brief illness. He was born in 1835, and was the executive officer with Sir Charles Newton's archæological expedition in Asia Minor in 1856-59. He explored the Cyrenaica and made successful explanations at Cyrene in 1860-61. Subsequently he became director-in-chief of the Government Indo-European Telegraph Department. He was the author of a "History of the Recent Discoveries at Cyrene," and of a "Handbook of Persian Art."

A PERMANENT committee for the study of tuberculosis as a national scourge has been formed in Russia. The president is Prof. W. D. Scherwinsky, of Moscow. The committee, which has met twice a month since the beginning of April, has, says the *British Medical Journal*, drawn up for itself the following programme of work: (1) Reports on the communications made on tuberculosis to the Pirogoff Congress and other medical societies in Russia; (2) reports of foreign congresses on tuberculosis; (3) reports on tuberculosis as an infectious disease (diagnosis, etiology—heredity, individual predisposition, external influences, mode of diffusion, economic and social factors); (4) statistical data respecting tuberculosis in Russia; (5) legislative measures and ordinances in regard to tuberculosis of human beings and beasts; (6) sanatoria, koumiss establishments, &c.; (7) the means actually in use, and which should be used, for the prevention of tuberculosis in the different provinces of Russia; (8) tuberculosis in animals and its relation to the disease in human beings.

THE new number of the *Geographical Journal* gives further particulars as to the preparations that have been made for the forthcoming National Antarctic Expedition. An executive officer, Lieut. Charles Roysds, R.N., of H.M.S. *Crescent*, has been appointed; and Mr. T. V. Hodgson (of the Marine Biological Station of Plymouth) and Dr. R. Koettlitz (of the Jackson-Harmsworth Expedition) will form part of the scientific staff, which Prof. Pollock (the holder of the chair of physics in the University of Sydney) will, it is stated, be invited to join. The name of the vessel used will be the *Discovery*. As was mentioned in our issue of May 31, the commanding officer of the expedition will be Lieut. R. F. Scott, R.N., and the leader of the scientific staff will be Prof. J. W. Gregory.

FROM information that has reached us from Mr. Rotch's Blue Hill Meteorological Observatory we learn that a kite used in the exploration of the air was on June 19 sent up to the height of 14,000 feet, thus exceeding the greatest height previously obtained there by 1440 feet. The temperature at this height was fifteen degrees below freezing point, the wind velocity was about twenty-five miles an hour from the north-east, and the air was extremely dry, although clouds floated above and below that level. The kites remained near the highest point from 5 to 8 p.m. On the way down the kites passed through a stratum of thin ragged clouds at the height of 1½ miles. These were moving with a velocity of about 30 miles an hour. At this time the wind at the observatory, about 600 feet above the general level of the surrounding country, had fallen to a calm. The highest point was reached with 4½ miles of music wire as a flying line supported by five kites attached to the line at intervals of about ¾ miles. The kites were Hargrave or box kites of the improved form devised at the

observatory. They have curved flying surfaces modelled after the wings of a bird. The three kites nearest the top of the line had an area of between 60 and 70 square feet each, and the two others about 25 feet each. The total weight lifted into the air, including wire, instruments and kites, was about 130 lbs.

MR. E. G. GREEN, Government entomologist at the Botanic Gardens at Peradeniya, Ceylon, has recently been able to confirm by personal observation the web-spinning habits of the red ant (*Ecophila smaragdina*). He has seen ants actually holding larvæ in their mouths and utilising them as spinning machines. To find what would be done, some leaves which had been newly fastened together by the ants were purposely separated by Mr. Green. The edges of the leaves were quickly drawn together by the ants, and, about an hour later, small white grubs were seen being passed backwards and forwards across the gaps made in the walls of the shelter. Each grub (there were apparently only two of them) was held in the jaws of one of the worker ants, and its movements directed as required. A continuous thread of silk proceeded from the mouth of the larva, and was used to repair the damage. There were no larvæ amongst the occupants of the disturbed inclosures, and the grubs used for spinning were apparently obtained from a nest a short distance away, which probably accounts for the considerable time that elapsed before the rent was repaired.

THE temperature of the free air is the title of a paper communicated by Dr. Hergesell to Part V. of *Petermann's Geographische Mitteilungen*. We have frequently referred to the great importance of this subject and to the valuable work performed by Dr. Hergesell in organising ascents of manned and free (or unmanned) balloons, and in discussing the results of the observations obtained. In the present paper he collects and discusses the most recent materials, and deals especially with the daily range and the vertical decrease of temperature in the upper strata of the atmosphere. The observations show that even at a height of a few hundred metres, there is a very small diurnal range; at night-time it amounts, in some ascents, to only a few tenths of a degree, and in the day-time, at about 800 metres, to some 3° or 4° Centigrade, when solar radiation is unobstructed. On cloudy days, and in the mean values, the daily amplitude is much less. With respect to the vertical decrease of temperature, the results of thirty sets of observations show that in all levels up to 10,000 metres an extremely varying temperature obtains, according to the season of the year and the conditions of weather. The decrease at that height reached or exceeded 40° C. in all cases, but no fixed rule could be laid down as to the regular decrease with altitude.

A RECENT number of the *Scientific American* contains a very interesting account of the use of a diver for the collection of zoological specimens that has been made in the Bay of Avalon, California. A large double-ended surf boat, in which the pump was placed, was towed to the scene of operations and anchored securely, bow and stern. Besides this, a number of observation boats, with glass bottoms, were used, and through these every movement of the diver could be observed. As soon as the diver was ready to descend, a scoop-net and a spike were handed to him. Stepping down, round by round, he finally pushed off and slowly sank to the bottom in about twenty-five feet of water. Through the glass bottom of the observation boats every movement could be plainly seen, as the diver walked through the weed, parting it on each side with ease, and collecting such specimens as seemed desirable. In one walk he brought up angel fishes, star fishes, holothurians, echini, a number of large univalve shells, a living shark, and numbers of small shells. The result of two days' work demonstrated the value of this method of collecting specimens, as in using a dredge many of the most delicate forms were injured. Where a diver is used it

is not necessary to take them from the water, the specimens being transferred in the water from the wire collecting-basket to a glass jar. The experiments are stated to have proved beyond question the value of the diver in work of this kind, as the ground covered was a veritable forest of macrocystis, in which groups of rocks were scattered, making work with a dredge impossible.

THE Russian steamer *Rurik* has arrived at Tromsø, from Spitsbergen, bringing news from the Russian expedition, which had wintered on the island for the measurement of an arc of the meridian. No news could be sent until now, because the carrier-pigeons which the expedition set free on Spitsbergen refused to fly southwards and obstinately returned to the wintering place. The *Rurik* probably brings in a full report from the chief of the expedition, Prof. Th. Tchernysheff, but from a telegram of the learned geologist, which was sent to the Academy of Sciences from Tromsø, we already learn that all members of the expedition were well. During the winter astronomical and physical observations were made according to the programme. Photographs were taken of auroræ and their spectra, and in the spring observations were made on Mount Keilhaus, at the signal-pillar of the meridian arc. South Spitsbergen was crossed several times. Akhmatoff made pendulum measurements on Mount Keilhaus. The state of ice was still unfavourable in Storfjord, and Prof. Tchernysheff's intention was to make more excursions and, leaving the "ice-breaker" at Storfjord, to try to reach the Swedish party at Seven Islands.

THE Transbaikalian Railway will be opened for traffic this month. It begins at Irkutsk, wherefrom a line, forty miles long, goes to Lake Baikal. There the train is placed on an ice-breaker-ferry and is transported to the Mysovskaya Station on the eastern shore of the lake, whence it runs 665 miles past Verkhnedinsk, Chitá, and Nerchinsk (the town—not the mines) to Sryétensk. Steamers ply regularly during the summer from this little town down the Shilka and the Amur to its mouth. At the station Kaidalóva, near Chita, begins the railway across Southern Transbaikalia, Mongolia, the Great Khingan Mountains and Manchuria, *viâ* Tsitsikar (on the Nonni) and Mukden, to Port Arthur. Work is busily carried on along this last line, building going on on several sections at once: in Transbaikalia, at Tsitsikar, and at the southern end of the line.

MESSRS. CADETT AND NEALL have sent us a sample of their X-ray paper. It is claimed for this material that a great reduction in exposure is effected as compared with the most rapid dry plates, about one-eighth of the usual exposure being all that is required. The paper has also the advantage over glass plates of freedom from risk of breakage, flexibility and consequent adaptability to the object to be photographed, and portability. The reason for paper of this description requiring so much less length of exposure than ordinary dry plates, is because less density is required for a reflecting surface to show structure than is required for a plate from which prints are required; consequently, with the X-ray paper, and using a 10-inch coil with a good tube, a good print of a hand can be obtained with about two seconds exposure; or, using an electrolytic break with the coil, with less than one second exposure.

AN ingenious machine for solving any algebraic equation of the form $\beta x^n + \beta x^{n-1} + \beta_2 x^{n-2} + \dots = A$, by an application of the principle of Archimedes, is described by M. Georges Meslin in the *Journal de Physique* for June. It consists of a beam balanced on a knife-blade from any point of which may be suspended a solid of revolution, and a series of such solids is provided, constructed in such a manner that in the solid of order n the volume cut off by a horizontal plane is proportional to the n th power of the distance of the horizontal plane from

the lowest point. Thus for orders 1, 2, 3, the forms of the solids are a cylinder; a paraboloid of revolution, a cone. If the solid of order n is suspended at a distance p from the knife-blade, then when it is immersed to a depth x in liquid, the moment of the resultant upward thrust of the fluid about the knife-edge is proportional to $p x^n$. The operation of solving the equation consists in adjusting the weights at suitable distances, p, p_1, p_2 from the axis, and balancing them, then running water into a trough containing the solids until the fluid thrusts balance a weight A fixed at unit distance from the axis of the beam; when this is done the equation of moments takes the form of the given algebraic equation and x , the root of the equation is equal to the depth of immersion of the solids.

IN the *Rendiconto del R. Istituto Lombardo*, xxxiii. 11, 12, Prof. Luigi Berzolari considers a generalisation of the problem enunciated by Tanturri, of discovering the number of conics meeting a given algebraic gauche curve in eight points. The generalisation consists in the problem of finding the number of conics meeting one or more given algebraic curves in a points, passing through b given points and touching c given planes, where $a + 2b + c = 8$, and a number of results are given referring to the particular cases when one or more of the algebraic curves are straight lines.

ALTHOUGH it is now about sixty years since Moser published the results of his experiments on the action of light upon various surfaces as revealed by the condensation of vapours upon them, the character of the change produced by light still remains a mystery. Theories have been suggested, guesses have been made, but little or nothing has been proved. Major-General J. Waterhouse, I.S.C., has, during the last year, accumulated some additional interesting facts in connection with this subject. He fully confirms Moser's results as to the production of a change on the surface of metallic silver by exposure to light that can be demonstrated by the condensation of a vapour, such as mercury upon it. But he has gone further, and demonstrated the change by the deposition of silver from solution, after the manner of the development of an exposed wet collodion photographic plate. By some half hour's exposure in bright sunshine "printed out" images were obtained, that is, images visible without any subsequent application of a developer. General Waterhouse shows that these results are not due to pressure against the mask or stencil plate used, nor to the emanation of vapours from it, nor to heat. Usually blue light gives a much stronger effect than red, but in one experiment when the exposure was for three hours to bright sunshine, the effect was reversed, and the patches under red, orange and yellow glasses were developable, while those under the blue and violet glasses were not. But when the silver plate was heated to redness, quenched in dilute sulphuric acid, washed and dried, and the cut out design was also warmed before use, the effect produced by light was so small that it seems doubtful whether there was any effect at all. On the other hand, if the silver plate was exposed to the fumes of certain substances, especially nitric acid, it was rendered very much more sensitive. General Waterhouse, in his communication to the Royal Society, states that he hopes to continue the investigation this summer, and invites others to extend the observations that he has described.

IN the course of the Cavendish Lecture on the "Application of Pathology to Surgery," recently delivered by Mr. H. T. Butlin, of St. Bartholomew's Hospital, to the West London Medico-Chirurgical Society, a good deal was said with reference to research work, especially in relation to pathology. In the course of the lecture the need was pointed out of two species of pathological laboratories for research—one for research in pure pathology, without any reference to its application, which

"need not be attached, so far as its site is concerned, to any hospital. The other for research in applied pathology, the laboratory for inventors, must needs be attached to the hospital; and those who work in it should have the freest access to the wards, even if they are not in charge of special wards, and should have every opportunity of observing what is done there and in the operating rooms. In order that they may be thoroughly instructed in the science of pathology, they should be taken from among the workers in the laboratory of pure pathology, and should be selected on account of their special aptitude for the work of research and for the originality they have exhibited. They leave the school of discoverers and the science of pure pathology for the school of inventors and the science of applied pathology." After alluding to the advance that has been made during the last few years, the lecturer said: "Money and organisation are necessary if great results are to be secured. The laboratories for research in pure pathology are too small and too scattered, and insufficiently endowed. The laboratories in the hospitals, which ought to be devoted to applied pathology, are used for every kind of microscopical and bacteriological examination and for teaching, so that research is crowded out. And pathological chemistry, from which vast things are to be hoped in future, has taken no proper hold upon the town." An investment of funds for the advancement of medicine and surgery, something like the provisions made in certain industrial establishments in Germany for research, was needed, in the opinion of the lecturer, who had no doubt as to the advantage which would accrue from such a movement.

IN No. 6 of the *Trusts College Studies* appears an important paper, by Mr. J. S. Kingsley, on the ossicles of the ear, which concludes with a suggestive discussion on the origin of mammals. In regard to the latter part of the subject, the author, as might be expected, attaches much importance to the fate of the quadrate bone of the lower vertebrates in mammals. And he arrives at the conclusion that the incus is mainly the representation of that element, although a portion of the latter may be included in the tympanic ring. It is further urged that the articulation of the lower jaw with the skull in mammals does not correspond with the same articulation in the lower vertebrates, but is entirely a new formation.

As regards the origin of mammals, Mr. Kingsley urges that the ancestral type must certainly have possessed a freely movable quadrate bone; from which he is led to conclude that the fixed suspensory arrangement of the lower jaw found in the chimæroid fishes, *Ceratodus*, and amphibians, is an acquired, and not a primitive, feature. Hence the fringe-finned fishes like *Polypterus* indicate the ancestral stock of the higher vertebrates. Reverting to mammals, it is shown that the anomodont reptiles of South Africa are far too specialised to have been the parent stock. From this and other inferences it is concluded that "no reptile has yet been found which will in any way fit the requirements for the ancestor of the mammalia; but that all known facts point rather to a line of descent from forms allied to the amphibia." There is, however, no amphibian type which conforms to the necessities of the situation, and it is accordingly necessary to go back to the common ancestor of the existing salamanders and cœcilians, and of the extinct labyrinthodonts or stegocephalians. In conclusion, it is stated that the ear-bones negative the view advanced by Mivart as to the egg-laying mammals having developed from a separate stock to that which gave origin to the other members of the class.

MEMOIR 4 of the Australian Museum, Sydney, deals with some of the Crustacea obtained during the trawling expedition of H.M.C.S. *Thetis* off the coast of New South Wales in the early part of 1898. Mr. T. Whitelegge, who has been entrusted with

the description of this group, states that the collection of Crustaceans obtained during the cruise is remarkably rich in forms either new to science or to the fauna of New South Wales. Of the forty-five species recorded, twenty come under the latter category and nine under the former. But the present fasciculus applies only to the higher groups of the class, and when the lower forms are worked out a still larger proportion of novelties may be expected. The new types are figured in a well-executed series of plates.

IN its *Bulletin*, No. 180, the Michigan State Agricultural College Experiment Station sets an excellent example by calling attention to the noxious insects which have been most numerous during the past year in that district, and the best means for their destruction.

THE North London Natural History Society's syllabus for the period July to December has just reached us, and gives promise of an interesting session.

THE *Bibliotheca Mathematica*, iii. 1, contains a heliogravure portrait of the late Sophus Lie, together with a descriptive list of his papers by F. Engel, of Leipzig.

MESSRS. WILLIAMS AND NORGATE'S "Book Circular" for June has reached us. In it are to be found notes on new and forthcoming scientific publications, and a list of works on medicine, natural history, chemistry, physics, mathematics, &c.

WE have received Nos. 7 and 9 of *Scientia*. The former, by Dr. Denis Courtade, is entitled "L'Irritabilité dans la Série Animale," while the latter, by Dr. Pierre Bonnier, is called "L'Orientation," and deals with the notion and perception of space by animals, and the localisation of external objects.

THE conclusion of the series of articles on "South African Lepidoptera," by F. Barrett, in the *Entomologist's Monthly Magazine*, appears in the current issue of that periodical, and in it is contained the first instalment of an account of "An Excursion to Egypt, Palestine, Asia Minor, &c., in search of Aculeate Hymenoptera," from the pen of Rev. T. D. Morice.

THE July issue of "Climate, a quarterly journal of Health and Travel" contains several interesting articles, such as "The Art of Travelling" (an interview with Mrs. Bishop, the traveller), and "The Malaria Question," by the editor, in which a good deal of information is given in a compressed form.

IN the new number of "The Journal of the Royal Agricultural Society of England," Mr. W. E. Bear, in an article on "Fumigation for Insect Pests," passes in review the methods of fumigation that are or have been in use in various parts of the world, and the measure of success they have met with.

THE July number of *Knowledge* has as its leading article an account of the recent total solar eclipse, by Mr. E. W. Maunder. It is accompanied by a "process" reproduction of a full-page drawing of the corona, the work of Miss C. O. Stevens. Dr. W. Stanley Smith has commenced in the same periodical an interesting series of articles on Early Theories of Fermentation.

THE current number of *Science Gossip* contains the first of a series of "Geological Notes in Orange River Colony," from the pen of Mayor B. M. Skinner, which probably will appeal to a wider circle of readers just now than would have been the case had war not broken out. The present instalment deals with the country lying between Enslin and Bloemfontein.

THE *Agricultural Journal*, published by the Department of Agriculture, Cape of Good Hope, always contains many items of interest and value to the student of agriculture. The issue for May 10, which has just come to hand, contains, among other things, a good portion of the inaugural address on "The Bearings of Education and Science on Practical Agriculture," which was delivered by Prof. Somerville at Cambridge in November last.

THE Commissioner of Agriculture for the West Indies has issued a handy and useful pamphlet, entitled "Hints and Suggestions on Planting in Tobago." The greater portion deals with the subject of cacao culture, and is written by Mr. E. R. Smart, and revised by Mr. J. H. Hart and others. Short notes on other plants are from the pen of Sir R. B. Llewelyn, formerly Administrator of Tobago.

THE Yorkshire College, Leeds, on behalf of the East and West Ridings Joint Agricultural Council, will provide courses of instruction in the following subjects throughout the ensuing year:—Results of the Garforth and other experiments in the East and West Ridings; agriculture; veterinary hygiene; horticulture; and poultry keeping. A guide has been issued by the two bodies to experiments at the Manor Farm, Garforth, for the year 1900.

THE *Zambesi Mission Record* is a well-edited quarterly periodical, which contains not only reports of the religious and educational work done by the Catholic Mission under the auspices of which it is brought out, but also from time to time notes and articles on the natural history, botany and meteorology of the area traversed by the society; thus the issue for July contains notes on the weather and climate from observations taken at Bulawayo during 1899, and a lengthy contribution, entitled "By an African Pool," in which there is a good deal of popular science, appealing for the most part to the ornithologist. The latter article is illustrated by well-executed "process" blocks of photographs of specimens from the Albany Museum, Grahamstown.

RECENT successful attempts to prepare tubes and bulbs of fused quartz have led to a more detailed study of the thermal properties of this material. Its low coefficient of expansion and absolute unalterability at high temperatures would point to fused silica as an ideal material for air thermometry, and hence the observation by M. P. Villard in the current number of the *Comptes rendus*, that it resembles platinum in being permeable to hydrogen at high temperatures, is a disappointing one. A manometer connected to a pump and quartz tube, the latter being heated in a Bunsen burner to about 1000° C., shows a slowly increasing pressure, amounting in the course of a day to several centimetres of mercury, and on examination the gas proved to be nearly pure hydrogen. The same number contains a note by M. Dufour on the resistance of fused silica to sudden changes of temperature in which it is stated that quartz tubes, even although badly made, may be heated to any temperature and plunged into cold water without showing any signs of breaking.

IN the current number of the *Berichte* is a note by Dr. Vaubel on the phenyl derivative of diimide, NH:NH. This has been isolated in a simple manner from the products of reduction of diazoamidobenzene with zinc dust in alkaline solution. Phenyl-diimide C₆H₅.N:NH is an oily liquid of a pale yellowish colour, which can be distilled in steam, and possesses a strong odour of almond oil. Since it cannot be distilled with steam from an alkaline solution, it would appear to possess acid properties; it is very poisonous, and has no reducing action upon Fehling's solution. Contrary to expectation, it explodes neither on

heating nor by shock. On account of its great stability towards oxidising agents, the author suggests the formula $C_6H_5N : NH$ as being the most probable.

THE additions to the Zoological Society's Gardens during the past week include two Tigers (*Felis tigris*, ♂, ♀) from India, presented by H.H. the Maharani Regent of Mysore; a Black-eared Marmoset (*Hapale jacchus*) from South-east Brazil, presented by Mrs. G. L. Bagnell; a Pine Marten (*Mustela martes*), British, presented by Mr. C. G. Beale; a Common Squirrel (*Sciurus vulgaris*), British, presented by Mr. Cecil Slade; a Yellow-cheeked Amazon (*Chrysotis autumnalis*) from Honduras, presented by Mr. S. Hankings; two Crimson-crowned Weaver Birds (*Euplectes flammeiceps*) from West Africa, presented by Mrs. Charles Green; a Sharp-nosed Crocodile (*Crocodilus cataphractus*) from West Africa, presented by Mr. J. A. Robb; a Four-lined Snake (*Coluber quatuorlineatus*), European, presented by Mr. W. R. Temple; four Natterjack Toads (*Bufo calamita*), European, presented by Mr. Stanley S. Flower; two Great Wallaroos (*Macropus robustus*, ♂, ♀) from South Australia, three Wrinkled Terrapins (*Chrysemys scripta rugosa*) from the West Indies, deposited; an Adanson's Sternothera (*Sternotherus adansonii*), a Common Chamæleon (*Chamaeleon vulgaris*) from the Soudan, received in exchange; a Burrhel Wild Sheep (*Ovis burrhel*), two Black-backed Gulls (*Larus marinus*), a Herring Gull (*Larus argentatus*), bred in the Gardens.

ERRATUM.—We are asked to state that in the report of Prof. S. Young's paper, read before the Physical Society on June 22, on the Law of Cailletet and Mathias, the words "1 per cent." (p. 215, col. 1, line 3) should be "0.1 per cent." The 0 was omitted from the report sent to us.

OUR ASTRONOMICAL COLUMN.

COMET GIACOBINI (1900 a).—Several observations have been made of this comet since its conjunction with the sun, but it is reported as faint. The following positions are an abridgment from the Ephemeris by Herr Ristenpart in *Astronomische Nachrichten*, No. 3636.

Ephemeris for 12h. Berlin Mean Time.						
1900.	R.A.			Decl.		
	h.	m.	s.			
July 12	...	22	29	5	...	+46° 25' 9"
14	...	12	29	...	...	46 50' 9"
16	...	21	55	5	...	47 5' 1"
18	...	37	4	...	...	47 7' 1"
20	...	18	42	...	...	46 55' 9"
22	...	21	0	16	...	46 30' 8"
24	...	20	42	2	...	45 51' 8"
26	...	24	19	...	...	45 0' 0"
28	...	20	7	20	...	43 56' 4"
30	...	19	51	16	...	+42 42' 4"

The comet attains its maximum north declination on the 18th, to the north-west of α Cygni, afterwards travelling in a south-westerly direction through Cygnus and Lyra.

WALTER PERCY SLADEN.

BY the death of Walter Percy Sladen, the world has lost one of the most lovable of men, and science an earnest devotee—a worker content to spare no effort could he but discover the truth.

Sladen was born on June 30, 1849, at Meerelough House, near Halifax, Yorkshire, and was educated at Hipperholme Grammar School, and afterwards at Marlborough under Dean Bradley. He came of an old Yorkshire family, who have been much respected for many generations; and ease and refinement of manner were among his marked characteristics, while the charm of his address endeared him to all with whom he came in contact.

He never attended a regular academic course of instruction in the branch of science in which he became eminent; his elementary training was self-acquired, and his leaning towards zoology innate. The definitive choice of the Echinoderma as the object of his life's work was of his own seeking, after much consideration; and in this he showed great force of character and a power of self-reliance which there was reason earlier to believe he possessed, for even before he entered Marlborough he evinced an unusual predisposition towards science, in founding for his boy friends a scientific society devoted more especially to the study of astronomy, in connection with which he became known among them as the "Astronomer Royal." Little did he think that he would in later life become for ten years a secretary of a leading scientific society, and that for eighteen he would conduct the affairs of a zoological research committee, as he did in his capacity as Secretary to the British Association Table of the Naples Station.

Sladen's scientific work, so far as his published memoirs and papers are concerned, extended over a period of seventeen years, 1877 to 1893. Of these there are thirty-four in all—twenty-one from his own hand, thirteen in conjunction with his intimate friend and adviser, the late Prof. Martin Duncan. Beyond these there stand to his record certain bibliographical notices and miscellanea. Of the thirty-four published works, fifteen of which he was sole, and four of which he was joint author, deal with the starfishes; and of the remaining fifteen, nine were joint, and devoted, with the exception of two, to fossil forms. Conspicuous among these are reports upon the collections made by the Geological Survey of India; and among those which he alone produced are Parts i. and ii. of the second volume of the Palæontographical Society's Memoirs on the Fossil Echinodermata, which were his last published works. They deal with the Cretaceous Asteroids, and appeared in the Society's volumes for 1890 and 1893. His first three papers deal with the remarkable creature *Astrophiura*, whose generic name is self-explanatory. The first, a brief description, was published in the *Proceedings of the Royal Society* for 1878; the other two, each containing a Latin diagnosis, in the *Zoologischer Anzeiger* and *Annals and Magazine of Natural History*, the year following. His remaining papers appeared in the *Annals* and the *Journal of the Linnean Society*, the publications of the Royal Society of Edinburgh, and elsewhere. They mostly deal with whole collections, and include reports on those made in the Arctic Region in 1875–1876, on those of the *Alert*, *Knight Errant* and *Triton*, as also those made in the Farøe Channel, the Korean Sea, and the Mergui Archipelago. In each Sladen produced good results, as in the discovery of genera such as *Micraster* and *Rhegaster*; and what more natural, therefore, than that he should have been entrusted with the working out of the Asteroids collected by H.M.S. *Challenger*, the report upon which was the crowning achievement of his life.

This magnificent work of 900 pp., with its accompanying atlas of 118 plates, ranks among the most masterly and exhaustive of the *Challenger* volumes. Before taking it seriously in hand, Sladen visited every museum in Europe (with one exception) which was known to contain starfishes of importance; and, as pointed out by the editor in its preface, it is a monograph of the whole group. The labour involved in its production was prodigious; and its interest is enhanced by the fact that the bulk of it was written between the hours of 9 p.m. and those of early morning, often after a day's occupation with other affairs. The extension of the family Pterasteridae and the great addition to our knowledge of the deep-sea forms are its most salient characters; but we know not which to admire most, the body of the work, with its laborious descriptions of individual forms, or the supplemental part, in which there is given a list of every known species, with a record of its bathymetric distribution. Elementary student and expert stand alike indebted to him for this monumental work, indispensable to progress in the knowledge of the subject with which it deals. Generic names like *Benthaster* and *Marsipaster* are sufficiently significant in themselves. Proceeding to classification, Sladen made good use of the marginal and ambulacral plates, and his subdivision into the sub-classes *Euasteroidea* and *Palæasteroidea*, with the ordinal divisions to which he was led, has withstood the test of time and become the adopted classification of the better textbooks, as for example those of Lang and Gregory. In this his influence on the progress of science will live, and it is a matter of profound gratification that only a short time before his death